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orchard too much sheltered by lofty hedges, rows of trees, &c. which are the only true ways to avoid disappointment and chagrin at the yearly loss of your fruit; as an example of the good effects of which, I know a cottager's orchard made out of an old gravel pit, so sheltered by hedges, bushes, and trees, as scarcely ever to fail, notwithstanding the barrenness of the soil.

I am, Sir,

Your most obedient humble servant,

THOMAS WHITE.

To C. Taylor, M.D.
Sec. to the Society of Arts, &c.

*On covering the Soil in Hot-beds, &c. By
Mr. Henderson, of Berskin Castle.*

(From the Transactions of the Caledonian Horticultural Society.)

I. Directions for covering the Soil in Hot Beds, Pinceries, &c.

For this purpose, lay on the surface fine drifted river or sea sand, three inches deep. This covering possesses many advantages. It will extirpate the slater or wood-louse, as the nature of the sand prevents the insect from concealing itself from the rays of the sun. In dung hot-beds it keeps down the steam. To fruit it affords a bed as warm and as dry as tiles or slates. This covering also retains the moisture in the earth longer than any other, and is itself sooner dry. It gives the house a clean neat appearance; and though it cannot be expected to remove the infection where already introduced, will be found a powerful preventive of that great evil mildew.

II. Observations on the sowing of early small Seeds.

It appears to be a fact, that the produce of some small seeds is connected with the time of sowing. Six years ago I sowed on the flower border in front of our hot-houses about 140 different kinds of annuals, allowing to each a patch of earth, and tallying them. In the other borders and shrubbery I sowed the same kinds with equal care, and gave each patch about half a spadeful of compost dung. Of the first sowing, all the kinds grew except about five or six; of the second, not ten different kinds appeared in all our extensive borders. It happened, that, at the time of the first sowing, there was a field in the park

laid down in grass, and, at the time of the second, another was laid down with equal care. In the first, the clover was complained of as too abundant; in the second, there was no clover at all, except about the head ridges. Sixteen years ago, I observed the very same result in an early and later sowing of lucern. The natural course in these instances would be, to lay the blame on the seeds, and to complain of the merchant; but it turns out, that the seed in these cases were taken from the same bags. There must, therefore, be some other cause of the failure of the latest sowing; and it will be found in the relation in the time of sowing, to the production of those insects which destroy the seed-leaf of the plant. Insects are not produced, as is vulgarly imagined by the East wind, but proceed from eggs, crysalides, &c. deposited the former year. At certain seasons, provided the weather is warm, these insects are produced in astonishing numbers.

It is worthy of observation, that plants suffer most severely when frost succeeds a few days of warm weather. The warmth first hatches the insect; the cold checks vegetation, and retains the plant in the seed-leaf; and by this is the young brood supported. In weather of this sort the annual weeds of the same age with these early plants will be observed in the same manner perforated and cut down.

An angler must imitate the flies which are hatched at their respective seasons; and on his attention to this branch of his art depends in a great measure his success. As different insects are hatched at different periods in the season, it will be of advantage to regulate the time of sowing in such a manner, that the vegetation of the seed, and the birth of its enemy, may not meet together.

In all the cases above mentioned early sowing was advantageous. There are crops, however, which do not admit of this precaution, and for them proper antidotes are to be sought. In turnips, which are so frequently lost in the seed-leaf, I have found that the expedient of dusting the ground with soot, deserves more attention than it receives. It should be employed in a damp morning; and when rain falls soon after the operation, it will be useful to go over the ground a second time. For field turnips, a box might be fixed on the roller to sow the soot with the seed, or a machine might be formed for dusting the plant when it is in the seed-leaf. For garden turnips the best machine is the hand,

Remarks on the construction of Hot-house flues, for drying houses for the purposes of bleachers and manufacturers. By Robert Stevenson, Esq. Civil Engineer.*

(From the Transactions of the Caledonian Horticultural Society.)

I beg to communicate to you, for the information of the Horticultural Society, the particulars of an experiment, made some years since, with a view to the heating of drying-houses, for the purposes of bleachers and manufacturers; being of opinion that the same principle may be usefully employed in the heating of stoves, vineries, &c. in gardens.

The apartment in which the experiment was made measured fifteen feet in length and nine feet in breadth, upon the floor. The fire-place was at one end, and the fuel was supplied on the outside of the walls. From the fire thus situated, a flue, six inches by ten inches, was conducted under a floor of tile brick: this flue was made to cross under the floor several times before it reached the chimney, at the farther end of the room. By this means the smoke and heat were longer detained in their passage to the chimney; and being made to traverse the whole of the floor, it was confidently expected that the temperature of the apartment would be speedily raised to about 100 degrees of Fahrenheit. The result, however, proved otherwise, for it was with considerable difficulty that a temperature of from 60° to 70° could be maintained.

The flues were then removed, and cross walls erected in their places, for supporting the floor. These cross walls were of open brick-work, so that the whole space under the floor formed one large flue for the smoke and heated air. After making this alteration, the same quantity of fuel was put into the same fire-place, as before, and the temperature was speedily raised to 150° at which it could be maintained for any length of time, with the ordinary expenditure of fuel.

I was some time since applied to by Messrs. Rennie, Airth and Company, of Ar-

broath, (who are extensively concerned in the bleaching of yarns,) regarding the heating of a new drying-house, which they had just erected. It was stated, that their former drying-house was much smaller than the new one, and that with two fires and flues, constructed in the ordinary way, so much difficulty was experienced in producing a sufficient degree of heat, that they were afraid even a third fire, in very cold damp weather, might be found necessary, on account of the larger dimensions of the new house.

Upon visiting the works, I found the walls of the house so far advanced as to be ready for the roof. It is situated at one end of a plot of grass land, unconnected with any other building, and therefore exposed on all sides to the weather. I recommended that the earth within the house should be excavated to the depth of four feet, which was as low as the foundation of the walls had been carried. When this was done, a fire-place was opened at one end of the house, and a flue was carried to the other end, when it turned and was brought down the middle of the floor; and after being conducted a second time to the end of the house, opposite the fire-place, it communicated with a chimney which carried off the smoke. This flue, measuring three feet in height and two feet in breadth, makes its evolutions in a space equal to the area of the building, and four feet in depth under the sole of the door. The flues were, therefore, not only much larger than is common, but as the division walls for supporting a pavement-floor over the flues were all made of open brick-work, the whole space above described was thereby converted into one large flue, or chamber, for heated air, which is made to issue from the open joints left between the pavement stones of the floor, and circulates freely to every part of the interior of the building; so that with one common fire the temperature of this drying-house, whose area measures thirty-five feet by eighteen feet, and fourteen feet in height, from the ground floor on which the flues rest, is speedily raised to, and easily maintained at, from 70° to 90° of Fahrenheit, while hung full of wet yarn, and while the shutters in the upper part of the walls are set open, to allow the steam arising from the process of drying the yarn to escape. This effect, which is much greater than could be produced in the old drying-house belonging to the same gentleman, although of much smaller dimensions,

* Some useful hints may be extracted from this paper to assist bleachers in constructing their drying-rooms by the use of stoves, to obviate the great difficulties to which they are subjected from want of drying in the winter months.

and heated with two fires, is to be ascribed entirely to the larger flues of the new house.

It therefore appears, that the simple application of as large flues as the circumstances of hot-houses will admit, would not only be attended with much advantage in point of economy, as a very small fire would be sufficient to maintain the temperature usually required in hot-houses; but, what perhaps is of more consequence, flues properly constructed upon this principle can be easily regulated, and will induce a much more uniform degree of heat. It seems from this experiment, that the flues in general use are of too small dimensions, that there is not capacity in them for allowing the heated particles of air to expand, and that the heat passes through the narrow flues, and makes its escape with the smoke in a latent state, without being allowed to act upon a surface large enough to rob it of its caloric.

Upon this principle churches and large halls might be heated; and one fire might be made to heat a much greater range of vineries than is in practice at present; it would also be a great improvement in the construction of hot-houses, and even of garden inclosures, to make the walls hollow,* as well on account of such a construction inclosing a space of air, which is an excellent non-conductor, as of the facility with which a fire may be applied, by converting the whole, or greater part, of the wall into a flue or receptacle for heated air. When this is to be done the fire-place should be kept as low as possible; and, after answering its purpose in the hot-house, the flue might be made to communicate with the hollow garden-wall, and the smoke made to escape at a chimney situated, according to circumstances, at a greater or less distance from the hot-house. An apartment heated with a flue of a large construction is less incident to sudden changes of temperature than where the flues are small. The heat in large flues can be regulated with much precision, and they are attended with the advantage of seldom or never requiring to be clean-

ed. In all chimnies of this kind an aperture should be made in the wall with a close shutter, near the top of the chimney, where a lighted candle or lamp should be introduced, for an hour or two, immediately after the fire is put on, in order to create a current, and thereby bring the smoke to issue at the chimney top.

On preventing the Worms in Carrots, and on preserving Colliflowers through a great part of the Winter; by Mr. Smith, of Keith Hall.

(From the Transactions of the Caledonian Horticultural Society.)

I. On preventing the Worms in Carrots.

About five years ago I had a heap of pigeon-dung, which lay through the winter months on a quarter of the garden. Having occasion to remove all this dung to other parts of the garden, I laid down the quarter with carrots, and was surprised to observe an extraordinary production of this vegetable on the spot where the dung had lain, both with respect to their size and cleanness. And although some worms might have been found in the other parts of the quarter, yet I could perceive none in the spot above alluded to.

From that time, this circumstance induced me to adopt the practice of sowing my carrots always in one particular spot of ground, which I have annually manured well with pigeon-dung, laying on always as much of it, though of a hot nature as if it had been rotten horse-dung. And I have the satisfaction to observe, that I have never failed to have an extraordinary crop, and, what is of more consequence, can venture to affirm, that a worm could not be found in my carrots during the four years that I have continued this practice.

Last year, in thinning my carrots, I transplanted a few of them into a piece of ground that had been well dunged with rotten horse-dung; and though they grew very well, yet they were so much cankered that they were almost unfit for any use.

All this leads me to think, that pigeon-dung is a good preventive of the worm in carrots.

II. On preserving Colliflowers through a great part of the Winter.

As colliflower is a most desirable vegetable, so it deserves to be kept as long for use as possible.

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* At Peterhead, in Aberdeenshire, there is a dwelling-house with hollow walls of brick work, belonging to a Mr. Leslie, of that place, who, I believe, has thoughts of taking out a patent for his ingenious method of making bricks, and building houses with a double or hollow walls.